

EUROPASS SUPPLEMENT TO THE DIPLOMA

TITLE OF THE CERTIFICATE (original language: ES)

Técnico Superior en mantenimiento aeromecánico de helicópteros con motor de pistón

TRANSLATED TITLE OF THE CERTIFICATE (English)

Diploma of Higher Education in the Aeromechanical Maintenance of Piston Engine Helicopters

PROFILE OF SKILLS AND COMPETENCES

The holder has acquired general skills relating to carrying out programmed and corrective maintenance of engines, airframe and mechanical, hydraulic, pneumatic and electrical systems of piston engine helicopters, both on a line and in the hangar and workshop. He or she also participates in the manufacturing and assembly processes of components, applying the regulations in force and the required quality in accordance with the technical documentation, complying with specific aeronautical regulations, the occupational risk prevention and environmental protection plans, and participating in maintenance management.

Within this framework, each PROFESSIONAL MODULE includes the following LEARNING RESULTS that the holder acquires.

“Fundamentos de electricidad” (Fundamentals of Electricity).

The title holder:

- Characterises the fundamentals and basic concepts of electricity applying and interpreting the laws and rules that govern it.
- Characterises the operation of components and elements of direct current circuits, describing their characteristics, types, applications and the methods used to produce electricity.
- Calculates direct current electric circuits, applying the necessary laws and rules for their resolution.
- Calculates alternating current electric circuits, applying the laws and principles that characterise it.
- Characterises the basic principles of electromagnetism, describing the properties of magnetic fields and the interaction between fields and electrical conductors.
- Characterises direct current machines, describing their constituent elements, characteristics and operation.
- Characterises alternating current machines, describing their constituent elements, characteristics and operation.
- Calculates the operating parameters of transformers, applying the basic principles that govern their operation.

“Fundamentos de electrónica en aviónica” (Fundamentals of Electronics in Aeromechanics).

The title holder:

- Measures basic parameters of different types of semiconductor diodes and thyristors, analysing their operation and application in circuits.
- Characterises the principles and use of transistors, describing their operation.
- Characterises linear integrated circuits, operational amplifiers and logic circuits used in avionics equipment, interpreting their operation from the block diagram.
- Determines the use of printed circuit boards in electronic equipment used in avionics, describing the manufacturing techniques and their constituent elements.
- Defines the operation of systems based on servomechanisms, describing the operating principles of their component elements.

“Técnicas digitales y sistemas de instrumentos electrónicos en aviónica” (Digital Techniques and Electronic Instrument Systems in Aeromechanics).

The title holder:

- Carries out different conversion operations between different numbering systems and between analogue and digital functions analysing their characteristics.
- Characterises the operation of data buses in aircraft systems, identifying the protocols and formats of ARINC signals, as well as other specifications.
- Builds logic circuits using different integrated circuits, interpreting their applications and symbology.
- Defines the constituent elements and operation of microprocessors, analysing the various data storage and transmission systems.
- Defines the process of data transmission by optical fibre and its application in aircraft systems, analysing its development.
- Characterises the behaviour of electronic display devices used in aircraft, analysing their characteristics.
- Identifies the effects of electrostatic charges and the influence of the electromagnetic environment on aircraft in devices that are sensitive to them, analysing their causes.
- Determines the effects produced by unapproved software changes on the airworthiness requirements of an aircraft, evaluating the software management control system.

- Characterises the general layout of typical electronic/digital systems, their associated equipment (BITE) on the aircraft, describing their location in the cockpit and in the enabled compartments.

“Materiales, equipos y herramientas en aviónica” (Materials, Equipment and Tools in Aeronautics).

The title holder:

- Characterises metallic materials used in aircraft structures, describing their physical and mechanical properties and the tests that define them.
- Characterises composite and non-metallic materials, other than wood, used in aircraft structures, describing their properties and constituent elements.
- Repairs composite structures, interpreting the working procedures and applying the associated techniques.
- Repairs wooden structures and textile coverings, interpreting the working procedures and applying the associated techniques.
- Identifies defects produced by corrosion in aircraft structures, analysing the underlying causes and their correction processes.
- Characterises fastening devices used in aircraft, defining their characteristics, applications and specifications.
- Characterises the rigid pipes and flexible hoses used in aircraft, defining their characteristics, applications and specifications.
- Characterises the structural layout and operation of the mechanisms used to transmit movement in aircraft, describing the physical laws on which they are based and their constituent elements.
- Characterises the constituent elements of the electrical cables and connectors used in aircraft, describing their construction and identification code.

“Prácticas de mantenimiento con elementos mecánicos de la aeronave” (Maintenance Practices with Aircraft Mechanical Elements).

The title holder:

- Applies usage criteria and safety regulations to the activities carried out in the workshop, analysing the work to be done.
- Carries out operations with tools and testing equipment used in aircraft maintenance, identifying the operating characteristics of the tools and measuring equipment used.
- Reads plans, diagrams and schemes, interpreting the rules of representation and associated symbols.
- Applies tolerance adjustment and control methods, selecting types according to their use.
- Performs machining, assembly and maintenance operations on flexible pipes and tubes, selecting the procedures and working methods.
- Assembles and maintains springs and bearings, performing the operations required in each case.
- Performs inspection and maintenance operations on transmissions and cables, applying the established procedures.
- Joins elements by means of rivets or adhesives and performs machining operations on metallic and non-metallic composite materials, interpreting the working procedures.
- Performs disassembly, inspection, repair and assembly operations, selecting the appropriate techniques.

“Prácticas de mantenimiento con elementos mecánicos de la aeronave” (Maintenance Practices with Aircraft Avionics Elements and Services).

The title holder:

- Applies aircraft maintenance procedures, following quality criteria.
- Connects and splices electrical cables, using the appropriate tools and methods.
- Checks aircraft systems, using appropriate avionics testing equipment.
- Performs autogenous, hard and soft welding, selecting the procedures and using the appropriate tools.
- Calculates the mass and centring of aircraft, applying the procedures specified in the relevant documents.
- Performs aircraft stewardship and hangar tasks, following established procedures.
- Characterises the inspection processes of abnormal events, determining the consequences they may have on the navigability of an aircraft.

“Aerodinámica básica” (Basic Aerodynamics).

The title holder:

- Calculates aerodynamic performance by interpreting equations and their applications in aerodynamics.
- Defines the phenomena that originate around a body immersed in an air current, interpreting the principles and equations that govern them.
- Defines lift and drag coefficients in an aerodynamic profile, analysing the physical principles that govern the behaviour of profiles immersed in an air current.
- Characterises the generation of vortices and their aerodynamic effects on wings, analysing the behaviour of the wing when it is immersed in a current of air.
- Defines the characteristics and parameters of flight in different situations, applying equations of dynamics and related aerodynamic concepts.
- Defines the concept of aerodynamic stability of an aircraft, interpreting its performance in flight in relation to the selected reference axes.

“Factores humanos” (Human Factors).

The title holder:

- Determines the factors that affect the performance of a maintenance technician in his or her work, relating their effects to the human limitations they cause.
- Defines the role of social psychology in the working environment, describing its applications.
- Assesses the influence of the characteristics of the physical environment on the performance of maintenance tasks, analysing their impact on the technician.
- Characterises the effects of communication on the performance of work in aircraft maintenance, analysing its possibilities.
- Selects the causes that promote human error in the workplace, interpreting their study models.
- Proposes measures to prevent occupational risks in the workplace, applying existing regulations to the aircraft maintenance environment.
- Selects employment opportunities, identifying the different possibilities of insertion and lifelong learning alternatives.
- Exercises the rights and complies with the obligations derived from labour relations, recognising them in the different employment contracts.
- Determines the protective action of the Social Security system in the face of the different contingencies covered, identifying the different types of benefits.

“Legislación aeronáutica” (Aeronautical Legislation).

The title holder:

- Characterises the international and European normative framework, interpreting the established regulations.
- Selects the instructions that regulate the operation and organisation of the different areas that affect aircraft maintenance, analysing the European regulations.
- Selects the instructions that regulate the operation and organisation of commercial air transport activities, analysing the European regulations.
- Defines the regulatory procedures to be followed by an aircraft design and manufacturing organisation, describing the instructions of the regulations that affect it.
- Defines types of reports and controls that are carried out in the aircraft maintenance environment, by selecting those parts of the regulations that are relevant to it.

“Aerodinámica, estructuras y sistemas de instrumentación, aviónica y luces” (Instrumentation, Avionics and Lighting Aerodynamics, Structures and Systems).

The title holder:

- Characterises the operation of the different sources of electrical supply, their distribution and control, interpreting the variations of their characteristic parameters and the functionality of their constructive elements.
- Performs maintenance operations on the helicopter's electrical system, interpreting the procedures established in the manuals.
- Characterises the operation of the avionics instrumentation, interpreting its parameters and the functionality of its construction elements.
- Performs maintenance operations on the helicopter's instruments and equipment, interpreting the procedures established in the manuals.
- Characterises the integrated modular avionics (I.M.A.) system, interpreting the overall network system, the network components, and the functions of the modules that can be connected.
- Characterises the operation of the on-board maintenance systems, interpreting their parameters and the functionality of their construction elements.
- Characterises the air traffic and information management system, defining its characteristics, architecture and performance.
- Characterises the operation of the lights, interpreting their parameters and the functionality of their construction elements.
- Performs maintenance operations on the helicopter's lights, interpreting the protocols established in the manuals.

“Aerodinámica, estructuras y teoría de vuelo, mandos de vuelo, sistema de conducción de potencia y rotores” (Flight Aerodynamics, Structures and Theory, Flight Controls, Power Steering System and Rotors).

The title holder:

- Characterises the behaviour of the helicopter in its different flight phases, analysing the aerodynamic effects generated.
- Characterises the operation of the helicopter control systems, describing the characteristics of their constructive elements and the different installation configurations.
- Performs maintenance operations on the helicopter's control system, interpreting the procedures established in the manuals.
- Characterises the operation of the helicopter's power steering system, describing the characteristics and functionality of its constructive elements.
- Performs maintenance operations on the helicopter's power steering system, interpreting the procedures established in the manuals.

- Characterises the operation of the helicopter rotors, analysing the vibrations they generate.
- Performs maintenance operations on the helicopter's rotors, interpreting the protocols established in the manuals.

“Aerodinámica, estructuras y sistemas hidráulico, combustible, neumáticos y de protección en helicópteros” (Aerodynamics, Structures and Hydraulic, Fuel, Pneumatic and Protection Systems in Helicopters).

The title holder:

- Characterises the operation of the helicopter's hydraulic system, describing the characteristics and functionality of its constructive elements.
- Performs maintenance operations on the helicopter's hydraulic systems, interpreting the protocols established in the manuals.
- Characterises the operation of the helicopter's fuel system, describing the characteristics and functionality of its constructive elements.
- Performs maintenance operations on the helicopter's fuel system, interpreting the procedures established in the manuals.
- Characterises the operation of the helicopter's pneumatic and vacuum systems, describing the characteristics and functionality of their constructive elements.
- Performs maintenance operations on the helicopter's pneumatic and vacuum systems, interpreting the procedures established in the manuals.
- Characterises the operation of the fire protection system, the ice and rain protection system, and the air conditioning system; interpreting the variations in their characteristic parameters and the functionality of their constructive elements.
- Performs maintenance operations on the helicopter's fire protection, ice and rain protection, and air conditioning systems, interpreting the procedures established in the manuals.

“Aerodinámica, estructuras, tren de aterrizaje, equipamiento y accesorios de helicópteros” (Helicopter Aerodynamics, Structures, Landing Gear, Equipment and Accessories).

The title holder:

- Characterises structures, interpreting the different components and designs as well as the functionality of each of them.
- Performs maintenance and repair operations on the structure of the helicopter, interpreting the protocols established in the manuals.
- Characterises the operation of the helicopter's landing gear, describing the characteristics and functionality of its constructive elements.
- Performs maintenance operations on the helicopter's landing gear, interpreting the procedures established in the manuals.
- Characterises the operation of the equipment and accessories, interpreting their parameters and the functionality of their construction elements.
- Performs maintenance and repair operations on the helicopter's equipment and accessories, interpreting the procedures established in the manuals.

“Motores de pistón” (Piston Engines).

The title holder:

- Characterises the operation of Otto cycle combustion engines, analysing engine parameter indications, in normal use and when diagnosing faults.
- Characterises the conservation, storage, installation and ground supervision of piston engines, interpreting the procedures established in the manuals.
- Performs maintenance operations for the conservation, storage, installation and ground supervision of piston engines, interpreting the procedures established in the manuals.
- Characterises the ground supervision operations of a piston engine, describing the procedures established in the manuals and checklists.
- Performs the maintenance, supervision and ground operations of piston engines, interpreting the procedures established in the manuals.
- Characterises intake and exhaust systems by describing their operation and constituent elements.
- Characterises the operation of the fuel and lubrication systems, describing the characteristics and functionality of their constructive elements.
- Performs maintenance operations on the fuel and lubrication systems, interpreting the procedures established in the manuals.
- Performs maintenance operations on high-voltage components and on electric start-up engines, analysing their constituent elements and functionality.

“Proyecto de mantenimiento aeromecánico de helicópteros con motor de pistón” (Project on the Aeromechanical Maintenance of Piston Engine Helicopters).

The title holder:

- Identifies needs in the productive sector, relating them to standard projects that can satisfy them.
- Designs projects related to the skills expressed in the diploma, including and developing its component phases.
- Plans the execution of the project, determining the intervention plan and associated documentation.

- Defines the procedures used to monitor and control the execution of the project, justifying the selection of variables and instruments used.

“Empresa e iniciativa emprendedora” (Company and Entrepreneurial Initiative).

The title holder:

- Recognises skills associated with entrepreneurship, analysing requirements derived from jobs and business activities.
- Defines the opportunity to create a small company, assessing its impact on the environment and incorporating ethical values.
- Carries out activities for the incorporation and start-up of a company, selecting the legal form and identifying the associated legal obligations.
- Carries out administrative and financial management activities for an SME, identifying the main accounting and tax obligations and filling in documentation.

“Formación en centros de trabajo” (Workplace Training).

The title holder:

- Identifies the structure and organisation of the company, relating them to the type of service it provides.
- Applies ethical and labour habits in the development of his or her professional activity, in accordance with the characteristics of the job and the procedures established in the company.
- Handles documentation relating to the maintenance and traceability of components, ensuring that the selected documentation is the latest revision or edition thereof.
- Performs operations related to programmed revisions of piston engines or their accessories and control elements, applying procedures established in the maintenance manuals.
- Performs operations related to programmed revisions of piston engine helicopter systems, applying procedures established in the maintenance manuals.
- Identifies faults in piston engine helicopters, applying the procedure defined for each case.

RANGE OF OCCUPATIONS ACCESSIBLE TO THE HOLDER OF THE CERTIFICATE

The Holder of a Diploma of Higher Education in the Aeromechanical Maintenance of Piston Engine Helicopters mainly works in the aircraft maintenance departments of the different airlines or companies dedicated to both passenger and freight transport or to other activities, performing line inspections and line and hangar/workshop maintenance operations.

The following are the most relevant occupations and jobs:

- Piston engine aeromechanical maintenance technician.
- Systems maintenance technician in a hangar or workshop.
- Piston engine adjustment technician.
- Electrical and electronic equipment technician and fitter.
- Structural maintenance technician in a hangar or workshop.
- Non-destructive testing technician.
- Line mechanic.
- Mechanical and electrical systems maintenance technician for flight simulators.
- Element and component manufacturing and assembly technician.

OFFICIAL BASIS OF THE CERTIFICATE

Name and status of the body awarding the certificate: The Ministerio de Educación (the Ministry of Education) or the Autonomous Communities in the area of their own administrative responsibility. The degree has academic and professional effects that are valid throughout the entire State.

Official duration of the Diploma: 2,540 hours.

Level of the certificate (national or international)

- NATIONAL: Non-university higher education.
- INTERNATIONAL:
 - Level 5b of the International Standard Classification of Education (ISCED 5b).
 - Level 5 of the European Qualifications Framework (EQF 5).

Entry requirements: A Bachelor’s Degree or a Certificate of having passed the corresponding access test.

Access to the next level of education or training: The holder will be able to access any university degree course.

Legal basis. Rules and regulations on which the Diploma is based:

Minimum teaching requirements established by the State: Royal Decree 1446/2018, of 14 December, which establishes the diploma of Higher Education in the Aeromechanical Maintenance of Piston Engine Helicopters, and which lays down the corresponding minimum education requirements.

Explanatory Note: This document is intended as supplementary information to the Diploma in question, but on its own it does not have any legal validity.

COURSE STRUCTURE OF THE OFFICIALLY RECOGNISED DIPLOMA

PROFESSIONAL MODULES OF THE DIPLOMA ESTABLISHED IN THE ROYAL DECREE	ECTS CREDITS
Fundamentals of Electricity.	6
Fundamentals of Electronics in Aeromechanics.	5
Digital Techniques and Electronic Instrument Systems in Aeromechanics.	6
Materials, Equipment and Tools in Aeromechanics.	6
Maintenance Practices with Aircraft Mechanical Elements.	11
Maintenance Practices with Aircraft Avionics Elements and Services.	5
Basic Aerodynamics.	3
Human Factors.	5
Aeronautical Legislation.	3
Instrumentation, Avionics and Lighting Aerodynamics, Structures and Systems.	6
Flight Aerodynamics, Structures and Theory, Flight Controls, Power Steering System and Rotors.	7
Aerodynamics, Structures and Hydraulic, Fuel, Pneumatic and Protection Systems in Helicopters.	9
Helicopter Aerodynamics, Structures, Landing Gear, Equipment and Accessories.	6
Piston Engines.	11
Project on the Aeromechanical Maintenance of Piston Engine Helicopters.	5
Company and Entrepreneurial Initiative.	4
Workplace Training	22
	TOTAL CREDITS
	120
OFFICIAL DURATION OF THE DIPLOMA (HOURS)	2,540

* 55% of the minimum education requirements of the diploma reflected in the above table is of an official nature and is valid throughout the national territory. The remaining 45% is specific to each Autonomous Community and may be reflected in **Annex I** to this supplement.

INFORMATION ABOUT THE EDUCATION SYSTEM

